

mer of a water-soluble ethylenically unsaturated monomer formed by polymerization in situ in an amount of 0.05 to 15% by weight based on the component (A).

5. A shaped structure as set forth in claim 4 wherein the water-soluble ethylenically unsaturated monomer is an ethylenically unsaturated carboxylic acid or an amide thereof.

6. A shaped structure as set forth in claim 5 wherein the water-soluble ethylenically unsaturated monomer is acrylamide.

7. A process for the production of water-resistant hardened shaped structures of gypsum comprising hardening a shaped structure comprising (A') calcium sulfate capable of hydration reaction, (B') a calcium type filler reactant in an amount of 17 to 300% based on said calcium sulfate (A') as calculated as calcium and (D) water in an amount sufficient to harden said calcium sulfate, the calcium type filler reactant (B') being calcium hydroxide, calcium carbonate, calcium silicate, calcium aluminosilicate, non-water-hardenable anhydrous gypsum or a mixture of calcium carbonate, calcium silicate, calcium aluminosilicate or non-water-hardenable anhydrous gypsum with calcium hydroxide, contacting the hardened shaped structure with an aqueous solution of a water-soluble polybasic acid or water-soluble salt thereof having a second stage dissociation constant of 10^{-3} to 10^{-10} as measured at 25° C. and thereby converting the calcium type filler reactant (B') so that (C) a water-insoluble or hardly water-soluble salt of said polybasic acid is formed in an amount of 0.1 to 30% based on the total components as calculated as calcium.

8. A process for the production of hardened shaped structures of gypsum according to claim 7 wherein said shaped structure further comprises a water-soluble ethylenically unsaturated monomer in an amount of 0.05 to 15% by weight based on the calcium sulfate (A') as calculated as the dihydrate with a catalytic amount of a polymerization initiator in the form of a solution, and said water-soluble ethylenically unsaturated monomer is polymerized while the shaped structure is being hardened.

9. A process for the preparation of hardened shaped structures of gypsum according to claim 7 wherein the surface portion of the hardened shaped structure is impregnated with the aqueous solution of a water-soluble polybasic acid or water-soluble salt thereof, the calcium type filler reactant (B') in the surface portion is converted to a water-insoluble or hardly water-soluble calcium salt of said polybasic acid so that the treated surface portion has a pore volume smaller than 0.50 ml/g in pores having a radius in the range of 75 to 75000 Å and a pore volume smaller than 0.20 ml/g in pores having a radius in the range of 4000 to 10000 Å.

10. A process according to claim 7 wherein in the treated surface portion of the shaped structure, the mode radius of pores is not larger than 0.5μ .

11. A process according to claim 7 wherein the polybasic acid is oxalic acid, phosphoric acid or hexafluorosilicic acid.

12. A shaped structure as set forth in claim 1 wherein the polybasic acid has a second stage dissociation constant of 10^{-4} to 10^{-9} .

13. A process for the production of hardened shaped structures of gypsum according to claim 7 wherein the step of hardening the shaped structure is carried out in a carbon dioxide gas atmosphere.

14. A process for the production of hardened shaped structures of gypsum according to claim 7 wherein the calcium type filler reactant (B') has a particle size distribution in which particles having a particle size larger than 40 microns occupy less than 10% of the total particles and particles having a particle size smaller than 20 microns occupy at least 50% of the total particles, said calcium type filler reactant having a specific surface area in the range of 10 to 400 m²/g.

15. A process for the production of hardened shaped structures of gypsum according to claim 14 wherein the amount of the calcium type filler reactant is from 25% to 150% based on calcium sulfate (A').

16. A process for the production of hardened shaped structures of gypsum according to claim 7 wherein the amount of water (D) added to harden said calcium sulfate (A') is from 0.3 to 1.5 parts by weight, per part by weight of the sum of the components (A') and (B').

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